## CLAIMS

1.  A method for determining characteristics of a sample
    liquid including a plurality of substances, wherein the
    method comprises the following steps:

    recording (220) current-voltage measurement data of a
    liquid with at least one known characteristic;

    transforming (235) the measurement data of the liquid
    into a feature space to obtain a first plurality of
    feature values;

    recording (240) current-voltage measurement data of the
    sample liquid;

    transforming (255) the measurement data of the sample
    liquid into the feature space to obtain a second
    plurality of feature values;

    determining (260) at least one characteristic of the
    sample liquid based on the feature values of the sample
    liquid in relation to the feature values of the liquid
    with the at least one known characteristic;

    wherein the steps of recording comprise the following
    steps:

    cyclically applying a voltage ramp to the liquid in both
    directions; and

measuring the electrolysis current as a function of the voltage applied.

2. A method of claim 1, wherein the liquids are a body liquid, liquid foods or washing liquids.

3. A method of claim 1 or 2, wherein the at least one characteristic corresponds to a concentration of the plurality of substances, a statement of diagnosis of illness or the period of time between taking the sample and administering a drug.

4. A method of one of the claims 1 to 3, further comprising the following steps:

   recording (200) current-voltage measurement data of a plurality of liquids which are predetermined as reference liquids;

   determining (215) a transformation matrix for the steps of transforming (235, 255) into the feature space.

5. A method of claim 4, wherein the step of recording (200) the current-voltage measurement data of a plurality of reference liquids further comprises the following step:

   rendering noisy the recorded current-voltage measurement data to obtain further current-voltage measurement data.

6. A method of claim 4 or 5, wherein the step of rendering noisy is carried out by adding a Gauss-distributed noise to the measurement data.

7.  A method of one of the claims 4 to 6, wherein the step
    of determining (215) the transformation matrix comprises
    the following steps:

    forming a covariance matrix from the measurements data
    of the plurality of reference liquids;

    calculating the eigenvalues and the eigenvectors of the
    covariance matrix belonging thereto; and

    forming the transformation matrix such that the
    transformation matrix provides a mapping rule for
    measuring vectors into a space which is spanned by the
    eigenvectors, of which the eigenvalues belonging thereto
    exceed an empirically predetermined threshold value.

8.  A method of one of the claims 1 to 7, wherein the step
    of determining (260) of at least one characteristic of
    the sample liquid comprises the following steps:

    determining the distance between the feature values of
    the sample liquid and the feature values of the liquid
    with the at least one known characteristic; and

    associating the at least one known characteristic ...
    ... ... ... ... ...
    voltage measurement data of a plurality of liquids with

transformed to obtain a plurality of feature vectors in the feature space.

10. A method of claim 9, wherein the step of determining (260) the at least one characteristic of the sample liquid comprises the following steps:

determining the distances between the feature values of the sample liquid and the feature vectors; and

associating the at least one known characteristic of the liquid with at least one known characteristic which is associated to the feature vector with the smallest distance, to the sample liquid.

11. A method of claim 9, wherein the at least one known characteristic of the plurality of liquids with at least one known characteristic are quantitative values which are related to one attribute, wherein the step of determining (260) the at least one characteristic of the sample liquid comprises the following steps:

interpolating between the feature values and the quantitative values of the plurality of liquids with at least one known characteristic to obtain an interpolation function which is defined in the feature space; and

associating the value of the interpolation function on the location of the feature values of the sample liquid to the sample liquids.

12. A method of one of the claims 1 to 11, further comprising the following step:

    calculating (205, 225, 245) the Fourier transform function of the measurement data,

    wherein the steps of transforming are applied to the Fourier transform function of the measurement data.

13. A method of one of the claims 1 to 11, further comprising the following step:

    carrying out a wavelet transformation of the measurement data,

    wherein the steps of transforming are applied to the measurement data which have been subjected to a wavelet transformation.

14. A method of claim 12 or 13, further comprising the following step:

    picking out (210, 230, 250) transformed measurement data, the sum of which is larger than a certain percentage of the total sum of all transformed measurement data,

    wherein the steps of transforming are applied to the transformed measurement data picked out.

15. A method of one of the previous claims, wherein an electrode material used for recording current-voltage

measurement data is the same for each of the steps (200, 220, 240) of recording.

16. A method of one of the previous claims, wherein the steps (200, 220, 240) of recording are carried out several times, wherein an electrode material used for recording current-voltage measurement data is changed each time, and wherein the several current-voltage measurements data are combined.

17. A method of claim 16, wherein a scan speed used for recording current-voltage measurement data is the same for each of the steps (200, 220, 240) of recording.

18. A method of one of the previous claims, wherein the steps (200, 220, 240) of recording are carried out several times, wherein a scan speed used for recording current-voltage measurement data is changed each time, and wherein the several current-voltage measurement data are combined.

19. A method of one of the previous claims, further comprising the following step:

    prior to the steps (200, 220, 240) of recording, diluting the liquids until the liquids exhibit a predetermined conductivity value.

20. A method of one of the previous claims, further comprising the following step:

prior to the steps (200, 220, 240) of recording, introducing (40) an inert gas into the liquid to drive out oxygen dissolved in the liquid.

21. An apparatus for determining characteristics of a sample liquid including a plurality of substances, the apparatus comprising the following features:

a recording means for recording current-voltage measurement data of a liquid with at least one known characteristic and for recording current-voltage measurement data of the sample liquid;

a first processing means for transforming the measurement data of the liquid into a feature space to obtain a first plurality of feature values, and for transforming the measurement data of the sample liquid into the feature space to obtain a second plurality of feature value; and

a second processing means for determining at least one characteristic of the sample liquid based on the feature values of the sample liquid in relation to the feature values of the liquid with the at least one known characteristic,

wherein the recording means comprises the following features:

a voltage generating means for cyclically applying a voltage ramp to the liquid in both directions; and

a measuring means for measuring the electrolysis current as a function of the voltage applied.

22. An apparatus of claim 21, wherein the liquids are body liquids, liquid foods or washing liquids.

23. An apparatus of claim 21 or 22, wherein the at least one characteristic corresponds to a concentration of the plurality of substances, a statement of diagnosis of illness or the period of time between taking the sample and administering a drug.

24. An apparatus of one of the claims 21 to 23, further comprising:

a means for determining a transformation matrix for usage with the transformation into the feature space from recorded current-voltage measurement data of a plurality of liquids predetermined as reference liquids.

25. An apparatus of one of the claims 21 to 24, further comprising:

a means for calculating the Fourier transform function of the measurement data,

wherein the means for transforming transforms the Fourier transform function of the measurement data.

26. An apparatus of one of the claims 21 to 25, further comprising:

a means for carrying out a wavelet transformation of the measurement data,

wherein the means for transforming transforms the measurement data having been subjected to a wavelet transformation.

27. An apparatus of claim 2 or 26, further comprising:

a means for picking out transformed measurement data, the sum of which exceeds a certain percentage of the total sum of all transformed measurement data,

wherein the means for transforming transforms the transformed measurement data picked out.

28. An apparatus of one of the claims 21 to 27, wherein the recording means comprises the following features:

a measurement chamber (20),

a counter electrode (5), a working electrode (10) and a reference electrode (15), which are located in the measurement chamber (20), wherein a fixed reference voltage is applied to the reference electrode (15);

a voltage generating means (25) for applying a voltage between the counter electrode (5) and the working electrode (10);

a voltage measuring means (25) for detecting the voltage between the working electrode (10) and the reference electrode (15); and

a current measuring means (25) for detecting the current flowing between the working electrode (10) and the counter electrode (5).

29. An apparatus of claim 28, further comprising:

   a means (30) for introducing an inert gas into the measurement chamber (20).

30. An apparatus of claim 28 or 29, wherein the three electrodes (5, 10, 15) are fixed to a probe, wherein the probe is replaceable.

31. An apparatus of claim 30, wherein the probe comprises the following feature:

   a means for amplifying the current flowing between the electrodes.

32. An apparatus of claim 30 or 31, wherein the probe further comprises the following feature:

   a means for controlling the temperature at the electrodes (5, 10, 15).

33. An apparatus of one of the claims 30 to 32, wherein the probe comprises several sets of electrodes (5, 10, 15) with different materials.

34. An apparatus of claim 33, wherein the electrode material is gold, platinum or graphite.